Chapter 4
Air Quality

This section analyzes existing air quality in the project vicinity and impacts the proposed project alternatives may have on air quality in the North Bend area. The analysis examines potential impacts using computer-modeling projections. The methodology and analysis are discussed in more detail in Appendix C.

4.1 Existing Conditions

Characterizing the existing environmental conditions in the vicinity of the project site is important to an air quality analysis. The evaluation of existing conditions considers the site geology, local meteorology, and information on current air quality levels. The focus is on the conditions that cause "fugitive dust," because it is the predominant pollutant of concern from sand and gravel (aggregate) mining operations. Fugitive dust emissions result from the dispersion of dust particles by prevailing winds and/or the turbulence caused by moving machinery and trucks.

The primary meteorological and geological conditions of the local area that play an important role in determining the amounts of fugitive dust are the following:

- Strength of winds affecting the project site
- Proportion of fine particles (silt) in the sand and gravel deposit
- Average moisture content of the deposit
- Number of days each year with measurable precipitation

The concentration of dispersed dust (and the other pollutants emitted by sand and gravel mines) impacting adjacent properties depends upon the following factors:

- Prevailing direction of winds, particularly during the dry season (June through September)
- Location of dust-creating activities (both in a horizontal and a vertical plane) relative to other land uses

The emission rates of the other pollutants emitted by sand and gravel mines are not determined by meteorological conditions.

The level of significance of impacts depends on the land uses of the affected properties (with residential properties being a much more sensitive use compared to commercial forest land or interstate right-of-way).

4.1.1 Regional Climate and Meteorology

The North Bend area has a modified version of the Pacific Maritime climate that controls weather in Seattle and most of the Puget Sound Basin. The Pacific Maritime climate is characterized by moderate temperatures, wet winters, and frequent onshore flows of moist marine air. Monthly average temperatures (in Fahrenheit) range from the 30s and 40s in winter and range from the 50s to the mid-70s in summer. Annual precipitation varies greatly depending on location and elevation, varying from nearly 102 inches at Cedar Lake, 82 inches at the Western Riverbend neighborhood, and 62 inches in central North Bend. Although Cedar Lake is the closest long-term monitoring site, the long-term data from Snoqualmie Falls is considered more appropriate for use in air quality analysis because average annual precipitation at Snoqualmie Falls is less than at Cedar Lake. Therefore, the Snoqualmie Falls data better represents a "worst-case" analysis of the project because the drier an area, the higher the fugitive dust emissions. Annual precipitation at Snoqualmie Falls ranges from 47 to 81 inches, with a long-term annual average of over 61 inches, almost identical to shorter-term data from central North Bend. There is an average of 175 days a year with rainfall of 0.01 inch or greater at Snoqualmie Falls. Climate data used in the air quality analysis is from Snoqualmie Falls and covered the period 1931 to 1998.

In the Pacific Maritime climate regime, winds generally range south to southwest in winter or during other rainy periods, with southwest winds predominating. Winds during fair periods, and generally throughout the warm months, are west to northwest. However, climate in the North Bend area is modified by the influence of frequent westward air flows of dry air over the Cascades. These winds occur frequently during periods of high pressure and can reach speeds of up to 80 miles per hour (mph). Winds above 20 mph are from the east-southeast far more than any other direction. In addition, the local area has strong downslope drainage winds, which tend to reduce the frequency of inversions in the Exit 34 area compared to much of the Puget Sound lowlands.

Historically, July is the driest month of the year. When combined with wind speeds and wind directions, it is the month with the greatest potential for fugitive dust emissions to affect residential areas closest to the mine site.

4.1.2 Local Air Quality

The Puget Sound Clean Air Agency (PSCAA) has stated that coarse particulate matter is the primary issue of concern for sand and gravel mine projects. The primary impacts are related to emissions of fugitive dust. Other pollutants of concern include carbon monoxide, ozone, oxides of nitrogen, sulfur dioxide emissions from the diesel engines of earth-moving machinery and trucks, and complex hydrocarbon emissions from asphalt production and diesel engines.

Air quality is regulated in the Puget Sound region by federal, state, and local agencies. The U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for a limited number of pollutants with the enactment of the Clean Air Act of 1970. These compounds are termed "criteria pollutants." Ecology and the PSCAA operate monitoring stations to measure concentrations of the criteria pollutants. Regions in the State that exceed the NAAQS are declared to be in "nonattainment" and are required to develop programs such as Automobile Emission Checks to meet the standards. When an area has demonstrated attainment, these pollution control programs must be maintained in place for at least 10 years and then the area is termed to be a "maintenance area." This is currently the status of the central Puget Region for carbon monoxide, ozone, and particulate matter.

4.1.2.1 Particulate Matter

Particulate matter consists of particles of wood smoke, diesel smoke, dust, pollen, or other materials. It has traditionally been measured in two forms: total suspended particulate (TSP) and respirable or fine particulate matter (PM_{10}.) TSP is airborne particulate matter of all sizes; PM_{10} is a subset of TSP and is defined as being smaller than 10 micrometers in diameter. Because of concerns about the effect of very fine particulates such as those found in wood smoke and combustion engine exhaust, the EPA, in 1997, established separate regulations for ultra-fine particulate matter smaller than 2.5 microns in diameter ($PM_{2.5}$). Three PSACAA air quality monitoring sites (located in industrial areas of Seattle, Kent, and Tacoma) have had a history of high PM_{10} level; therefore, PSCAA also monitored these sites for $PM_{2.5}$. $PM_{2.5}$ levels in North Bend would be lower than monitored levels in these heavily industrialized areas. On a yearly average, PM_{10} and $PM_{2.5}$ levels are higher in industrial areas than in residential areas.

Coarse particles larger than 10 micrometers in diameter make up most of the fugitive emissions from sand and gravel mines and represent a nuisance rather than a health threat (Schwartz, Norris, et al., 1999). Coarse particles settle out of the air fairly close to where they are produced. PM_{10} remains suspended in the air for long periods and is readily inhalable deep into the smaller airways of human lungs. High ambient concentrations of PM_{10} from combustion sources contribute to impaired respiratory functioning. Fine particulate matter is primarily responsible for haze that impairs the visibility of distant objects.

Studies by the Washington State Department of Ecology (Ecology) have shown that the burning of wood in stoves and fireplaces can account for more than 80 percent of the PM_{10} concentrations in areas of heavy woodstove use. The diesel engines of trucks and heavy equipment are another source of particulate matter.

The project site is located outside of any PM_{10} maintenance areas, which are concentrated in the urban industrial areas of Everett, Seattle, and Tacoma. The closest comparable particulate monitoring station site is operated by PSCAA and is located in Lake Forest Park north of Seattle. This station is in a region that is much more densely settled than the North Bend area. Due to its less dense residential development and windy local climate, somewhat lower particulate concentrations are expected in the North Bend area. However, the analysis of cumulative impacts of this Proposal conservatively assumed similar existing conditions in the North Bend vicinity because of the extensive use of wood for fuel in this area.

The Puget Sound region has met the federal standards for particulate matter since 1990, and in 1998 was redesignated as "in attainment" for the PM standards. New standards for very fine particulate ($PM_{2.5}$) went into effect in 1990, and the monitoring data indicates the region is in attainment.

In addition to the federal standards for fine particulate matter, there is a state regulation for "nuisance" fugitive dust. This regulation is rarely used, but may be applicable to the nuisance dust issues created by gravel operations. Because a major source of particulate matter in residential areas is the use of woodstoves and fireplaces, PSCAA has developed a control program known as "Burn Bans," based on monitored levels of PM_{10}. During such bans, the use of all wood burning stoves not meeting emission standards or non-certified pellet wood stoves is curtailed. Outdoor burning is prohibited during a burn ban. There were 62 hours of burn bans in 1999 and 225 hours in 2000.

4.1.2.2 Carbon Monoxide

Carbon monoxide (CO) is a toxic, clear, and odorless gas. Carbon monoxide interferes with the blood's ability to absorb oxygen and impairs the heart's ability to pump blood. Carbon monoxide is the primary priority pollutant associated with motor vehicle traffic. Monitoring for carbon monoxide is performed throughout the Puget Sound region by the Ecology and PSCAA. There are no monitoring sites within 15 miles of North Bend. Background concentrations of carbon monoxide in the site vicinity are primarily traffic generated, with a seasonal contribution from wood burning stoves, fireplaces, and land clearing fires. Local carbon monoxide levels are estimated to range from 1.0 to 3.0 parts per million (ppm).

Between 1991 and 1997, most of the urbanized (western) portions of Snohomish, King, and Pierce Counties were designated as non-attainment for carbon monoxide because the carbon monoxide levels exceeded the standard of 9 ppm as an 8-hour average. In 1997, these counties were re-designated as being in attainment but subject to "maintenance area" requirements (refer to Section 4.1.2 above for a definition of "maintenance area"). The project site lies outside the carbon monoxide maintenance area.

4.1.2.3 Ozone

Ozone is a pungent-smelling, colorless gas. It is a pulmonary irritant that affects lung tissues and respiratory functions and, at concentrations between 0.15 and 0.25 ppm, causes lung tightness, coughing, and wheezing.

Ozone is produced in the atmosphere when nitrogen oxides and some hydrocarbons (volatile organic compounds [VOCs]) chemically react under the effect of strong sunlight. Unlike carbon monoxide, however, ozone and the other reaction products do not reach their peak levels closest to the source of emissions, but rather at downwind locations affected by the urban plume after the primary pollutants have had time to mix and react under sunlight. Peak ozone concentrations in the Puget Sound region have been measured in an arc 15 to 30 miles in radius to the east and south of Seattle/Bellevue.

From 1991 to 1997 most of Snohomish County and all of King and Pierce Counties were designated as non-attainment for ozone because ozone levels exceeded 0.12 ppm. In 1997, these counties were re-designated as being in attainment but subject to maintenance area requirements.

4.1.2.4 Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, corrosive gas with a bitter taste. It has been associated with respiratory diseases. Sources of sulfur dioxide include power facilities, paper mills, smelters, and diesel engines. It reacts with atmospheric moisture to form sulfuric acid. Sulfur dioxide is monitored at several locations in the heavily industrial areas of Everett, Seattle, and Tacoma. The Puget Sound region is in compliance with federal and state standards, with no exceedances in the 1988 to 1998 period. Concentrations at the project site are expected to be well below these standards.

4.1.2.5 Nitrogen Oxide

Nitrogen oxide (NO_x) is a brownish, poisonous gas that reacts with water vapor to form nitric acid. It has been associated with respiratory diseases and is one of the essential precursors in the formation of ozone. Nitrogen oxide is formed from the high temperature combustion of fuels (such as diesel engines) and subsequent atmospheric reactions. It reacts with atmospheric moisture to form nitric acid which, together with sulfuric acid, falls as "acid rain" that damages vegetation and freshwater marine ecosystems. Nitrogen oxide has been monitored at sites in Seattle and Enumclaw only since 1996. Monitored levels at both sites are far lower than the state and federal standards. Levels at the project site are expected to be similar to those at Enumclaw.

4.2 Environmental Impacts

The primary pollutants emitted by a sand and gravel mine are the following:

- Fugitive dust (particulate matter) from the trucking, earth-moving, crushing, and screening operations and combustion source particulate matter from the asphalt plant, the engines of trucks and equipment, and slash burning
- Carbon monoxide, sulfur oxides, and oxides of nitrogen from diesel-powered front-end loaders, bulldozers, highway trucks, the asphalt plant, and the burning of land clearing debris
- Hydrocarbons of many types from diesel engine exhaust, evaporation of fuels, asphalt plant operations, and slash burning

Different methods are used for each type of source to determine their impact on existing air quality. However, in all cases the process is to first calculate the amount of each pollutant emitted by the source and then determine the resulting concentrations at the project's property lines and other potentially impacted locations.

Formulas and computer models developed by the EPA are part of the standard methodology for determining air quality impacts and were used to assess the impacts described below. It is widely accepted that the EPA-published emission factors are conservative and may overestimate particulate matter emissions. While the calculated emissions may be higher than the eventual actual emissions, they are based on the best available information and accepted calculation techniques.

Calculation of the amount of particulate matter emitted by all of the mining and processing operations were performed for each of the proposed alternatives. These calculations were based on the machinery planned to be used and average annual tonnage of material expected to be extracted and processed.

EPA has developed emission factors to be used to estimate emission quantities, which for the Proposal at peak production are presented in Table 4-1. These calculated emission quantities are best used to provide a general comparison of the alternatives. It is the concentrations of pollutants that are regulated at the federal and state level to safeguard human health and welfare. The emission quantities are input into a variety of computer dispersion models used to determine pollutant concentrations.

Table 4-1
Emission Inventory for the Proposal at Peak Production
(Emissions in Pounds Per Day and Tons Per Year)

Location	PM_{10}	$PM_{2.5}$	CO	SO_2	NO_x	VOCs
Lower Site	484 (41.8)	178 (15.1)	352 (65.2)	29.4 (4.5)	359 (55.2)	29 (5.4)
Upper Site	647 (58.7)	237(20.3)	15.7 (61.2)	25.3 (3.9)	288 (44.3)	1.8 (0.3)

Note: Annual emissions take into account the effect of wet days to reduce wind-blown emissions. The daily emissions assume that no rainfall of 0.01 inch or more has fallen that day.

4.2.1 Construction Impacts

4.2.1.1 Alternative 1–No Action

Under Alternative 1, commercial timber harvesting would occur, which would impact air quality during harvesting activities. Without a specific proposal, it is not possible to quantify the impacts.

4.2.1.2 Alternatives 2 and 3 (Including Limited Lower Site Mining)

Fugitive Dust and Exhaust Emissions

Construction impacts adjacent to the Lower Site would primarily come from removing the overburden and building the berm. At the Upper Site, the construction activity with the greatest potential to affect inhabited areas would be the burning of woody debris if permitted. Other construction activities on the Upper Site include building the access roads, building the conveyor belt down Grouse Ridge (Alternative 2 only), and preparing a site for the primary crusher. Fugitive dust emissions from the removal of overburden at the Upper Site would be considered part of the mining process and are included in Operation Impacts. Alternatives 2 and 3 would have construction emissions of very similar magnitude, calculated at 302 lbs/day (24 tons/year) of PM_{10}, 146 lbs/day (12 tons/year) of $PM_{2.5}$, 7.2 lbs/day of CO (1.1 tons/year), 10.1 pounds/day (1.5 tons/year) of NO_x and 1.8 lbs/day (0.2 ton/year) of VOCs.

The removal of overburden and berm building would last approximately 6 months. Overburden would be used immediately to make the berm, thus minimizing materials handling and machinery use. Building the concrete and asphalt batch plants and the aggregate processing facility would last approximately another 6 months. Restoration of the site after the aggregate resource is depleted would also last 6 months. Construction activities would be concentrated during the drier parts of the year. During very windy periods, fugitive dust may occasionally be a nuisance but would not pose a health hazard. Alternative 3 would not involve the construction of the conveyor down the west slope of Grouse Ridge, but the air quality impacts of the conveyor construction would be minimal; therefore, the overall impacts from Alternative 3 would be very similar to Alternative 2.

Disposal of Woody Debris

For Alternatives 2 and 3, both the Lower and Upper Sites would require some clearing before any earth-moving activities take place. Although both sites have been logged, they are now partially reforested. In addition, there is woody material on the forest floor, estimated to be 25 to 45 tons per acre[1]. There are several alternatives for the disposal of the non-usable trees and debris:

- Chipping for use as mulch or soil conditioner
- Burning in piles on site
- Hauling offsite to be disposed of by chipping or burning
- Stockpiling onsite for reuse during reclamation.

Nearly all the woody debris is located on the Upper Site. There are air quality benefits to choosing not to burn this material. Emission factors developed by EPA and by the U.S. Forest Service were used to calculate the quantity of pollutants that would be generated from burning woody waste. If all the material (including stumps) were to be burned, it is estimated the following emissions would occur under Alternatives 2 and 3 for the 25-year duration of the mining operations:

- PM_{10}–8.6 tons/year
- $PM_{2.5}$–1.7 tons/year
- Carbon monoxide–59 tons/year
- VOCs–1.2 tons/year

These quantities of pollutants would not likely result in concentrations exceeding the NAAQS at areas outside the site boundaries if burning is properly conducted during conditions of good atmospheric dispersion. Changes in weather while burning is in progress could lead to higher pollutant concentrations. Odors from the fires could be detectable under certain wind conditions.

4.2.1.3 Alternative 4–Upper Site Mining - Exit 38

Fugitive Dust and Exhaust Emissions

Alternative 4 would have fewer impacts on inhabited areas near the proposed project site than Alternatives 2 or 3 because only the Upper Site would be used. Exposed areas of the project on the Upper Site could be subject to higher winds than on the Lower Site and thus dust could

[1] Woody debris tonnage was estimated by walking the Lower and Upper Sites and comparing the debris to photographs of forest sites with measured quantities of wood waste.

be transported farther, but the distance from the Upper Site to residences is also much greater. However, overall, construction on the Upper Site would be less extensive and have fewer impacts on air quality than construction on the Lower Site.

Disposal of Woody Debris

Emissions from burning the woody debris under Alternative 4 would be only slightly less than for Alternatives 2 and 3 on a per year basis because the mass of woody debris is much greater on the Upper Site even though the total area to be cleared would be less.

4.2.2 Operation Impacts

A comparison of PM_{10} emissions for all proposed alternatives is as follows:

- Alternative 1–0
- Alternative 2–101 tons/year
- Alternative 3–111 tons/year
- Alternative 4–90 tons/year

Fugitive Dust

The Fugitive Dust Model (FDM) was run for Phase 8 of the proposed project (peak production) under each alternative assuming worst-case meteorological conditions. Receptors were spaced every 50 meters around the perimeter of the Lower Site and at the closest residences both north and south of Interstate 90 (I-90) and in the Middle Fork of the Snoqualmie River Valley. The results of the FDM are summarized in Table 4-2.

Table 4-2
Maximum PM_{10} Concentrations
(in Micrograms/Cubic Meter)

	24-Hour	Annual
Alternative 2		
Highest Receptor	31	10
Assumed 24-Hour Background Level	79	22
Project + Background Level	110	432
Percentage of 24-Hour Standard	73%	64%
Location of Highest Receptor: on southern boundary of Lower Site, adjoining I-90		
Alternative 3		
Highest Receptor	7	2
Assumed Background Level	79	22
Project + Background Level	86	24
Percentage of 24-Hour Standard	57%	48%
Location of Highest Receptor: on southern boundary of Lower Site, adjoining I-90		
Alternative 4		
Highest Receptor	1	>1
Assumed 24-Hour Background Level/Assumed Annual Background Level	79	22
Project + Background Level-24-Hour and Annual	80	22
Percentage of 24-Hour and Annual Standards	53%	44%
Location of Highest Receptor: Washington State Patrol Fire Training Academy I-90		

The proposed project's annual PM_{10} concentrations were extrapolated from the 24-hour concentrations using the factors developed by PSCAA in modeling for a Notice of Construction. The assumed 24-hour background level is the average of the highest 24-hour levels from the Lake Forest Park site (the most appropriate monitoring site in relation to the site) over the 1991 to 2000 period. This is a conservative background level, one that is unlikely to be reached at North Bend due to its lower density of population, which results in fewer cars and fireplaces per acre and a history of better wind dispersion.

4.2.2.1 Alternative 1–No Action

As described under construction impacts, air quality would be temporarily impacted under Alternative 1 during timber harvesting.

4.2.2.2 Alternatives 2 and 3 (Including Limited Lower Site Mining)

Particulate Emissions

The quantities of emissions for particulate matter, carbon monoxide, the nitrogen oxide, sulfur dioxide, and VOCs were calculated for all the operations expected to occur with the Proposal (Alternative 2). The calculations used the expected facility operating characteristics, equipment, and production rates to determine emissions over the short-term (pounds per 24-hour day) and long-term (tons per year). The daily emissions are based on operation during peak production (13,125 tons per day). The annual emissions are the quantities expected with a production of 2.1 million tons. This information is summarized in Table 4-1.

Asphalt Plant Emissions

The asphalt plant must meet the requirements of Best Available Control Technology (BACT). BACT is defined in the Washington State Administrative Code and would be implemented for this project by PSCAA. Meeting the BACT requirement is necessary to obtain a Notice of Construction, which is required before plant construction.

The asphalt plant would have a propane burner rated at 115 million BTU's per hour. Emissions of various pollutants could occur at a number of places in the asphalt production process, as summarized in Table 4-3. Sources of information for this plant's emissions include stack tests for PM_{10} for an identical plant (CSR in Everett, Washington) and EPA's AP42 manual.

Table 4-3
Summary of Asphalt Plant Sources of Emissions

Process	Potential Pollutant Emission
Loading cold feed bins	PM_{10}
Conveying aggregate into drum	PM_{10}
Heating & mixing aggregate in drum	PM_{10}
Heating & mixing asphalt	Hydrocarbons
Loading truck	Hydrocarbons
Transporting mix	Hydrocarbons

EPA's dispersion model (SCREEN3) was used to determine the asphalt plant's impact on air quality. The analysis used conservative meteorological assumptions that yield worst-case pollutant concentrations. The results of this dispersion modeling are shown in Table 4-4.

Table 4-4
Asphalt Plant Modeled Concentrations

Pollutant	Maximum Modeled Concentration	Air Quality Standard
PM10	8.5 μg/m3 (24-Hour Average)	150 μg/m3
SO_2	0.002 mg/m^3 (1-Hour Average)	1.05 mg/m^3
CO	0.17 mg/m^3 (1-Hour Average)	40.1 mg/m^3
Air Toxics		
Benzene	0.0020 μg/m^3 (Annual Average)	0.12 μg/m^3 (ASIL)
Formaldehyde	0.0048 μg/m^3 (Annual Average)	0.077 μg/m^3 (ASIL)

There is no short-term standard for NO_x and no standard for hydrocarbons.

ASIL = "acceptable source impact level" and is the annual concentration that could cause an excess cancer risk of one in one million.

Levels of PM_{10} are modeled at 6 percent of the EPA standard under worst-case conditions; SO_2 reaches approximately 0.2 percent of the standard; and carbon monoxide reaches less than 0.4 percent of the standard. Consequently, the application of BACT to the proposed project would reduce impacts on air quality to levels much below the NAAQS. Concentrations of air toxics (benzene and formaldehyde) are 1.7 percent to 6.2 percent of the applicable Acceptable Source Impact Level.

Asphalt plant pollutant concentrations would be far below the NAAQS and represent a very low impact.

Truck Traffic

Truck traffic generated by Alternatives 2 and 3 would be substantial. The air quality impacts of increased truck volumes at Exits 34 and 38 were analyzed using EPA's emission factor model Mobile5b and intersection dispersion model CAL3QHC. Concentrations were calculated at locations outside the project site and accessible to the general public, in accordance with EPA guidelines. Exit 32 was not analyzed for air quality impacts because it would not experience the increased truck volumes that would occur under the proposed project. Table 4-5 summarizes the results of this modeling.

Table 4-5
Project-Generated Truck Emission Impacts

Intersection	CO Level	PM_{10} Level
Alternative 2		
Exit 34- No Action in 2025	0.5 ppm	11.0 $\mu g/m^3$
Exit 34- Background plus project in 2025	0.5 ppm	14.0 $\mu g/m^3$
Alternative 3		
Exit 34- No Action in 2025	0.7 ppm	11.0 $\mu g/m^3$
Exit 34- Background plus project in 2025	0.7 ppm	14.5 $\mu g/m^3$
Exit 38- No Action in 2025	NA	NA
Exit 38- Project's effect in 2025	0.7 ppm	4.5 $\mu g/m^3$
Alternative 4		
Exit 38- No Action in 2025	0.6 ppm	3.8 $\mu g/m^3$
Exit 38- Project's effect in 2025	0.6 ppm	3.8 $\mu g/m^3$

Note: Projections of non-project vehicles volumes for 2025 were not available for the Exit 38 (Fire Academy Training Road) area.

Truck emissions would be well below the NAAQS and would represent a low impact.

Odor Impacts

Research has been conducted to determine the minimum concentrations of chemical compounds that people can detect. Asphalt facilities emit a wide variety of hydrocarbons, some of which have strong and distinctive odors and established "odor thresholds" (such as toluene and xylene). Using the emission factors developed by EPA for batch asphalt facilities, the maximum hourly concentrations of odoriferous compounds were determined. Based on models for the proposed project's asphalt plant, the maximum concentration of toluene reached 0.3 percent of the odor threshold, and the maximum concentration of xylene reached 0.2 percent. Therefore, it is unlikely that odors from the asphalt plant would be detectable beyond the boundaries of the Lower Site.

4.2.2.3 Alternative 4–Upper Site Only (Exit 34)

Asphalt Plant Emission and Odor Impacts

There would be no asphalt plant under Alternative 4; thus, there would be no resulting impacts on air quality.

Truck Traffic Emission Impacts

Truck emissions under Alternative 4 would be well below the NAAQS for all pollutants and represent a low impact.

4.2.3 Cumulative Impacts

PM_{10} has multiple sizable sources, and it is the pollutant for which an examination of cumulative impacts is most warranted. Table 4-6 summarizes cumulative PM_{10} impacts. The assumed background level is the average of the single highest 24-hour levels at PSCAA's South Hill monitoring site for 1991 through 1998.

Table 4-6
Cumulative PM_{10} Impacts

Intersection Source	PM_{10} Level At Lease Boundary ($\mu g/m^3$)	PM_{10} Level at Nearest Private Residence ($\mu g/m^3$)
Alternative 2		
Project's Concentrations	47.3	14.2
Assumed Background	79.0	79.0
Cumulative Concentration	**126**	**93**
Alternative 3		
Project's Concentrations	24.5	12.4
Assumed Background	79.0	79.0
Cumulative Concentration	**104**	**91**
Alternative 4		
Project's Concentrations	1	2.8
Assumed Background	79.0	79.0
Cumulative Concentration	**79**	**82**
EPA Standard	**150**	**150**

The cumulative impacts of the proposed project would be well under the NAAQS for PM_{10} and, thus, would have a low impact on the residential areas adjacent to the Lower or Upper Site. Impacts would decrease with increasing distance from the project site. Therefore, impacts at receptors such as the planned school site would be less.

4.3 Mitigation Measures

4.3.1 Alternative 1–No Action

There are no mitigation measures proposed for Alternative 1.

4.3.2 Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)

4.3.2.1 Fugitive Dust Control Techniques

Cadman, Inc. would initiate a dust control plan at the proposed project site, as required by PSCAA, and use BACT to control emissions. The goal of using BACT would be to ensure that there would be no visible dust (personal communication, F. Austin, 1994).

For crushers and screens that will be used at the site, the most commonly used dust-suppression technique is a water spray system. Water spray systems are effective in reducing particulate matter emissions by as much as 90 percent. Frequent watering of paved haul roads is an effective method to control dust. Dust reduction of much greater than the 50 percent assumed in the fugitive dust analysis for this FEIS could be achieved by a watering program, which maintains a constantly wet road surface. An effective undercarriage cleaning system would be installed at the entrance to the Lower Site.

Reduction of particulate emissions from fugitive dust consists of many techniques. The following mitigation measures are proposed.

- Maintain the aggregate in a moist condition while it is being conveyed, sorted, crushed, or stockpiled.
- Pave the access roads and the processing and batch plant yards.
- Keep the paved access roads and processing areas free of dust accumulations by frequent cleaning.
- Contain aggregate piles in 3-sided “bunkers,” where feasible, which would minimize the potential for wind erosion of the finer particles.
- Maintain wide shelterbelts of evergreen conifers to assist in trapping fugitive dust and reducing the effective wind velocity within the Lower Site processing area (Alternatives 2 and 2A only).
- Locate the processing plant and haul roads as far as possible from residential property to reduce air quality impacts.

4.3.2.2 Impacts of Burning Woody Debris

Reduction of emissions from the burning of land clearing debris would be best achieved by chipping/grinding the debris (including tree stems, branches, roots, and debris from past logging) for use as soil conditioners or stockpiling them for later re-spreading, instead of burning them. Alternatively, the woody debris could be hauled offsite for dispersal by burning or chipping elsewhere.

If Cadman, Inc. decided to burn the woody debris, a number of regulations would apply. Cadman, Inc. would need to obtain a Burning Permit from the Eastside Fire and Rescue Office in Issaquah. Typical conditions placed on burn permits include the meteorological conditions that must occur before burning can begin and establishment of a “no burn” season (personal communication, T. Tilling, Eastside Fire and Rescue, 2001).

4.4 Significant Unavoidable Adverse Impacts

Significant impacts are defined as levels of pollutants that are higher than federal, regional, or state standards. The proposed project would be unlikely to have significant unavoidable adverse impacts on air quality when the mitigation measures described above are applied.